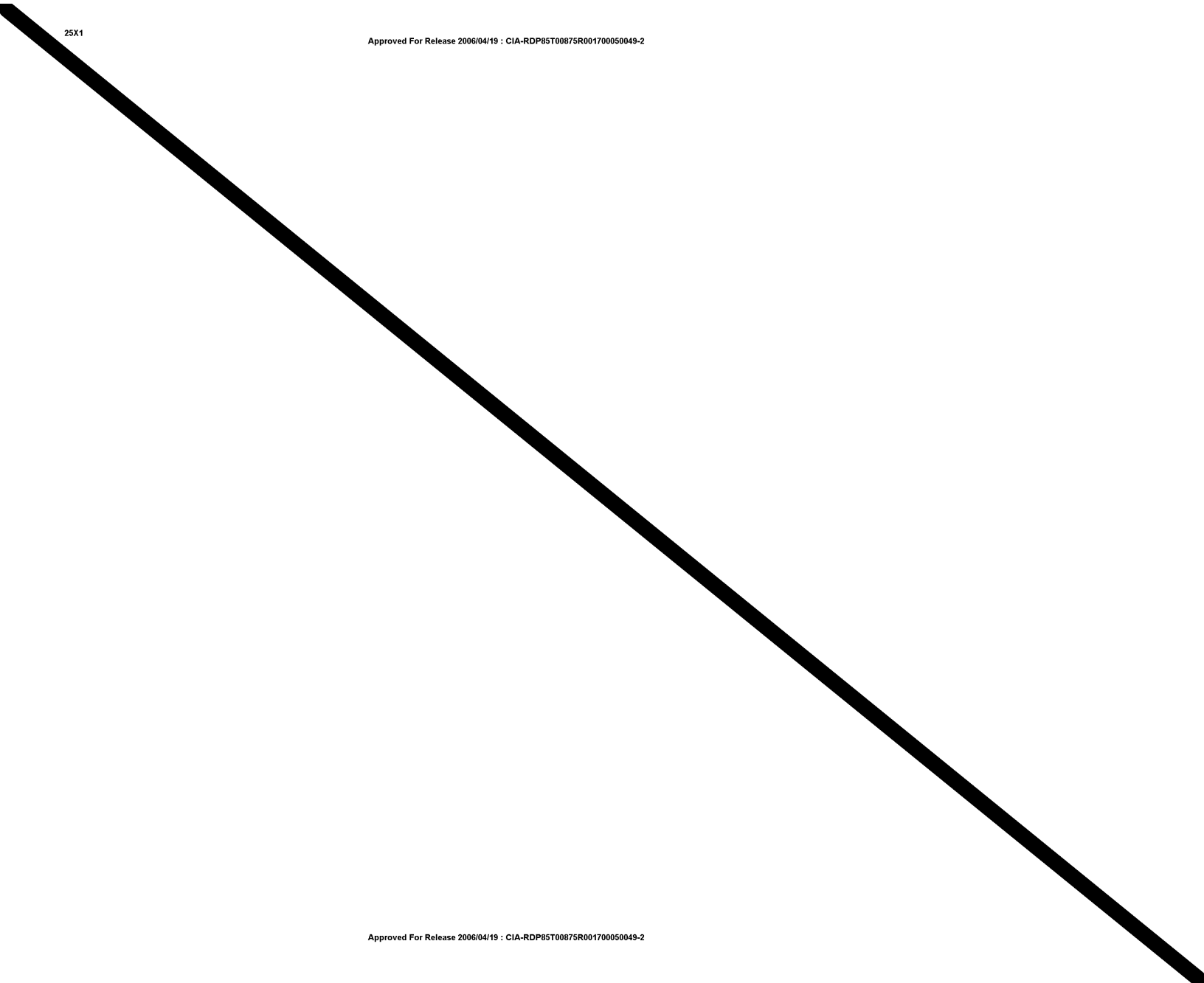

CIA/OER/IM 73-52

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INTELLIGENCE

Intelligence Memorandum

Shortages in the World Fertilizer Market

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ER IM 73-52
July 1973

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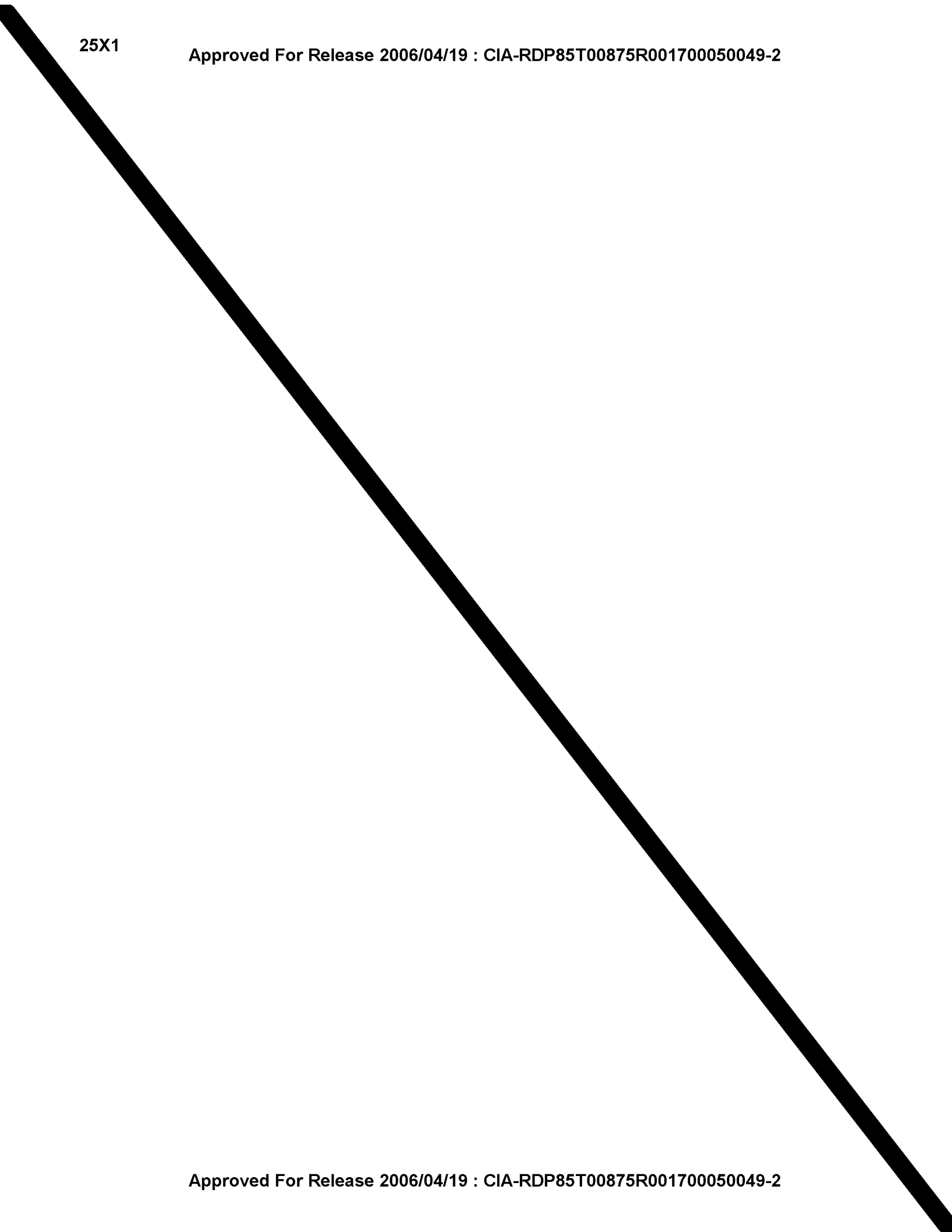

Approved For Release 2006/04/19 : CIA-RDP85T00875R001700050049-2

July 1973

Shortages in the World Fertilizer Market

In the past year the world market for nitrogen and phosphate fertilizers has shifted dramatically – from a situation of unused capacity and unsold stocks to a situation of short supplies and soaring prices. This transformation of the fertilizer market has been the result of intensive efforts to expand food production in the wake of worldwide agricultural failures. The increased demand fell on an industry that had reduced capacity and stocks following over-expansion in the 1960s. As a result, the poorer nations, where fertilizer consumption rates have remained low, have been especially hard put to find adequate supplies and to pay the escalating prices.

Shortages and price increases almost certainly will continue to characterize the world fertilizer market for the next year or two. New plant capacity will substantially increase the supply of phosphate fertilizers by the end of 1974 and of nitrogen fertilizers by the end of 1975. Supplies of potash fertilizer will most likely remain ample. The appearance of increased supplies of fertilizer will not necessarily end the shortages, because demand for food will also have increased rapidly with the worldwide rise in population, income, and living standards.

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Note: Comments and queries regarding this memorandum are welcomed. They may be directed to

DISCUSSION

Rapid Growth in the 1960s

1. Between 1960/61 and 1970/71, annual world production of chemical fertilizers[1] more than doubled from about 30 million tons to 72 million tons (Table 1). Rising demand for farm products and the limitations on cultivable land led to intensified efforts to increase agricultural yields through larger and more widespread applications of fertilizer. The demand for fertilizer became even more acute with the development in the 1960s of improved seeds that produce well only with heavy doses of fertilizer. The less developed countries (LDCs) more than tripled their consumption of fertilizers during the decade, but developed countries continued to account for more than 80% of world consumption.

2. A major development in the industry during the 1960s was the growing predominance of nitrogen fertilizers, which accounted for 45% of world production in 1970/71, compared with 37% ten years earlier. Growth was especially rapid among those nitrogen fertilizers, such as urea and ammonium nitrate, that have a high percentage of plant nutrients. These fertilizers are cheaper to store, ship, and apply.

3. During the 1960s the United States continued to be the world's leading producer, while the USSR moved up into second place. Canada, a minor producer at the beginning of the decade, was the world's third largest by 1971/72 (Table 2). Growth in output of nitrogen fertilizers was very rapid in the United States, the USSR, Poland, and a number of other countries (Table 3). One-half of the increase in world production of phosphate fertilizers in the decade ending in 1970/71 occurred in the United States, the USSR, and France (Table 4). During this period the USSR and Canada replaced the United States and West Germany as the leading potash producers (Table 5).

World Trade Up Sharply

4. World exports of chemical fertilizers, which amount to one-fourth of the total fertilizer produced, have increased about as rapidly as production. Almost 19 million tons were exported in 1970/71, compared with about 7.5 million tons a decade earlier (Table 6). The share of each

1. Including nitrogen, phosphate, and potash fertilizers expressed in metric tons of plant nutrients (N, P_2O_5, K_2O). Data are for fertilizer years, which run from 1 July to 30 June. In some instances, principally in the case of Communist countries, the governments report on a calendar year basis. Data for these countries, as used in the tables in this memorandum, refer to the first year stated – e.g., 1960 data are listed and are combined with 1960/61 data. The tables appear in the Appendix.

type of fertilizer in total exports remained essentially unchanged. Potash accounts for 50% of world fertilizer trade, nitrogen 35%, and phosphate 15%. During the decade, exports of fertilizer by Canada, the USSR, Japan, and the United States rose more rapidly than the total. The particularly rapid growth in Canadian and Soviet exports reflected sharp increases in potash production in those countries. Japanese and US exports of nitrogen fertilizer and US exports of phosphate also showed steep increases.

5. Since 1970/71, exports of fertilizer by the United States and the USSR have continued to rise. US exports have been particularly heavy since mid-1972, stimulated by devaluations of the dollar in December 1971 and February 1973 and by temporary price controls on domestic sales. According to preliminary estimates, US export volume, after rising by about 8% in 1971/72, jumped by 30% in 1972/73. Soviet fertilizer exports rose by 11% in 1971 and almost 7% in 1972. Soviet exports of phosphate fertilizer, however, fell by 12.5% in 1972, mainly because of the great domestic demand for these fertilizers.

6. Of the major fertilizer importing countries, the United States, China, and Poland showed the greatest increase in fertilizer imports during the 1960s (Table 7). US and Polish imports consisted largely of potash, whereas Chinese imports have been almost entirely of nitrogen fertilizer. Contrary to expectations during the mid-1960s that the LDCs would increase their share of imports rapidly, they accounted for only 30% of world imports in 1970/71, the same share as at the beginning of the 1960s.

Growth in Output Slackens

7. World fertilizer production increased by only 7% in 1971/72, after averaging better than 9% annually during the previous decade. The growth rate had been edging downward since 1968/69, and some severe cutbacks in productive capacity were made. The slowdown in 1971/72 was concentrated in the production of phosphate and, especially, nitrogen fertilizers. The industry had over-reacted to projections in the early 1960s of a world hunger crisis, with US firms in particular over-estimating the role of the United States in foreign agricultural development. Oil, gas, and mining companies in industrialized nations vied for access to a fashionable industry with seemingly limitless growth potential. Many plants were built in anticipation of rapidly increasing exports that did not materialize. As a result, by the late 1960s much of the industrial West had large stocks, excess fertilizer capacity, and declining profits. An estimated 20% of US capacity was closed by bankruptcy. US fertilizer production increased by about 3% in 1971/72, compared with an average annual rate of almost 8% in the previous decade.

Demand Pressures Rise

8. While world fertilizer capacity was being trimmed in certain categories and while production was growing at a reduced rate, demand continued to increase. Surplus stocks of fertilizer were gradually drawn down. By the spring of 1972, demand for several important nitrogen and phosphate fertilizers – in particular, urea, the ammonium phosphates, and concentrated superphosphates – began to exceed supply.

9. Then, quite suddenly in the fall of 1972, a sharp increase in demand for all types of fertilizers followed crop shortfalls in major areas of the world – the USSR, China, Australia, South and Southeast Asia, Africa, and South America. A steady depletion of international grain reserves caused a rapid escalation in grain prices and boosted the incentive for farmers to use more fertilizers. In the United States, fertilizer inventories fell by 13% in the ten-month period ending 30 April 1973. In addition to the inadequacy of productive capacity to meet the new demand, the situation was aggravated in certain countries by chronic operating problems. In the USSR and India, for example, some ammonia plants were operating at about 50% of capacity, and some phosphate plants at only about 60%.

10. At the same time that the supply situation was tightening, the structure of demand was changing. Farmers showed increasing preference for higher nutrient fertilizers that offer economies in transportation, storage, and application. Producers of fertilizers fell behind the fast-growing demand for urea and concentrated phosphate. A brief examination of the current situation for the major types of fertilizers is presented below.

Nitrogen Fertilizers: Heavy Demand for Urea

11. Urea fertilizers are in short supply worldwide as the result of heavy demand in developed countries and the recent growth of demand in India, Pakistan, Indonesia, and South America. Moreover, competing uses for urea are adding to demand pressures; increasing quantities of urea are being used in animal feeds and in the production of plastics. The burgeoning demand for urea is reflected in rates of plant utilization for the United States and Japan where urea plants are running at 97.5% and 95%, respectively, of rated capacity.

Phosphate Fertilizers: Raw Materials in Short Supply

12. A tight supply situation for phosphate rock and phosphoric acid is a major contributor to the present shortages of high-analysis phosphate fertilizers. In the United States, the world's largest producer of phosphate rock, domestic and foreign demand exceed effective productive capacity.

An increase of 8.6% in US sales (foreign and domestic) of phosphate rock in 1972 was followed by a drop of almost 17% in stocks in Florida and North Carolina. The USSR increased production of its major phosphate raw material – apatite concentrate – by 6% in 1972, but most of the additional production was absorbed domestically.

13. Shortages of phosphoric acid, a key intermediate material, have been a major deterrent to growth in output of phosphate fertilizers. In 1972, technical problems at plants in Mexico, Israel, and the USSR; a strike at a Belgian plant; and the late startup of a plant in Tunisia caused world supplies of phosphoric acid to fall far below expectations. According to preliminary data, a sharp increase in demand for phosphoric acid in the United States in 1972/73 was accompanied by a 46% reduction in exports and a 32% jump in imports.

Potash: Ample Capacity

14. In contrast to the shortages of nitrogen and phosphate fertilizers, world production capacity for potash exceeds demand. Most new potash capacity is being commissioned in the USSR, where increases in output in the past two years accounted for more than half of the increase in world production. Notwithstanding the excess capacity, world potash markets have been stable, largely because output by plants in Saskatchewan, Canada, has been held to about 50% of capacity. Only a relatively few countries are major producers of potash fertilizers, facilitating control over production and marketing.

Prices Increase Rapidly

15. The interaction of the supply and demand factors described above has resulted in substantial increases in fertilizer prices, the amount of increase varying widely from country to country and product to product. In the United States, wholesale fertilizer prices in April 1973 were about 10% above those of a year earlier, most of the increase occurring after the end of Phase II price controls. Fertilizer prices abroad also are rising rapidly. In early 1973, export prices for European urea were almost 50% higher than a year earlier; those for ammonium phosphate and triple superphosphate were up about 33%. Multinutrient fertilizers ordered by India from European suppliers in January 1973 were priced almost 30% higher than a year earlier. China recently contracted with Japan to purchase urea and ammonium sulfate for delivery in 1973/74 at prices 32% and 42% higher, respectively, than the previous year.

Continued Shortages in the Near Term

16. Uncertain factors such as weather and governmental policies make shortrun forecasts of the fertilizer market hazardous. Given the worldwide difficulties with agricultural production and the low level of fertilizer stocks, demand for many types of fertilizer almost certainly will strain supplies over the next year or two. Although world production of fertilizer may increase by about 7% in 1973/74, supplies will still be short, especially for urea, concentrated phosphate fertilizers, and phosphoric acid. As a result of the tight supply situation, and because of inflationary trends in costs of construction, production, and transportation, fertilizer buyers face rising prices.

17. The world supply of nitrogen fertilizer will increase markedly by 1975 or early 1976, mainly as a result of new urea capacity scheduled for commissioning in at least a dozen countries during 1973-75. A shortage in world energy supplies could reduce allocation of natural gas to production of fertilizer materials, with resulting spot shortages of ammonia and other nitrogen products, especially in the United States where production of ammonia is based almost entirely on natural gas. Regardless of the extent of physical shortages, rising world prices of natural gas and of alternative feedstocks will translate into higher prices for ammonia and for other nitrogen fertilizers.

18. The supply of phosphate fertilizers no doubt will increase substantially by the end of 1974 because of the greater availability of phosphoric acid. Operating difficulties at a major Mexican phosphoric acid plant apparently are being overcome, and in the next two years new phosphoric acid capacity is to be commissioned in various countries, including the United States, the USSR, France, Spain, Turkey, and Tunisia. In the United States, which had the capacity to produce 6 million tons of phosphoric acid (as P_2O_5) in mid-1972, 2.3 million tons of new capacity is scheduled for completion by early 1975. The improved prospects for phosphoric acid, however, depend partly on overcoming the current shortage of phosphate rock, which is expected to persist at least through mid-1974. This shortage is contributing to rising prices of phosphate fertilizers; the average US export price of phosphate rock rose 8% in 1972/73. [redacted] 25X1

19. World capacity for production of potash will likely be ample to cover anticipated increases in demand for the next several years. US list prices for potassium chloride to be in effect during July-September 1973 are 6% to 7% higher than prices in effect a year earlier. Canadian list prices reportedly will remain essentially unchanged in 1973/74. Nonetheless, higher marketing costs and the fact that actual sales prices last year frequently

were below list prices suggest that realized Canadian prices will be higher. Potash producers in North America and Western Europe face rising labor and fuel costs and higher railroad freight charges, so that prices will continue to be pushed up by costs even though capacity will remain adequate for buyers' needs.

20. International trade in fertilizers will continue to be active, as several countries will require substantial imports over at least the next two years – including China, India, Brazil, South Vietnam, Pakistan, and Indonesia. For instance, India this year is allocating 77% more funds for fertilizer imports than last year.

21. Natural gas shortages and higher gas prices may turn the United States into a net importer of nitrogen fertilizers some time during the 1970s, with prospective suppliers including the USSR, Canada, the Caribbean areas, and the Middle East. In this period, Soviet nitrogen and potash fertilizers are likely to play an increasing role on world markets. 25X1

Impact on Grain Output

22. Chemical fertilizer is an important factor in world grain output, although weather most certainly is the key factor. The impact of the fertilizer shortage has varied among major areas. In the United States and other developed countries, which account for more than 80% of the consumption of chemical fertilizers, spot shortages of various fertilizers have occasionally forced farmers to make do with what they could get. In the USSR, despite the likelihood of a substantial boost in fertilizer supply in 1973, application of fertilizers for grain crops remains well behind requirements, and the chronic deficiencies in the storage, transport, and use of fertilizers are being overcome only at a snail's pace. Extensive spring sowing, however, suggests that Soviet grain output in 1973, given favorable weather, will show a marked recovery from the 1972 low. For the most part, farmers in the developed countries have been able to get enough fertilizer for their spring 1973 crops or for application later in the growing season as side-dressing. Farmers in the LDCs have been less fortunate. It is the LDCs generally that have been unable to expand domestic production rapidly and that have been hurt the most by the tight international fertilizer market.

23. China, which suffered a 4% drop in grain production in 1972, has stepped up imports of grain. In addition, as part of a general shift in priorities in favor of agriculture, Peking recently has committed substantial sums to the purchase of a large nitrogen fertilizer complex in an effort to expand domestic output of fertilizer by 1976. In India, inadequate and poorly distributed fertilizer supplies during the wheat planting and growing season in 1972 were factors contributing to the shortfall in sown wheat acreage and subsequent yields. The wheat crop harvested in the spring of 1973 is estimated at about 26 million tons, slightly less than the previous year in spite of pleas by the government to boost output sharply. The amount of fertilizer available in India during 1972/73 was about 2.7 million tons, only a fraction higher than the amount available in the previous year.

24. Similarly, Pakistan, Indonesia, the Philippines, and other LDCs that had serious droughts in 1972 or have chronic food shortages want to expand acreage and step up fertilizer application rates to get more food in 1973. Their attempts to promote domestic production of fertilizer generally will have limited results in the near term. Their efforts to increase imports of fertilizer are hindered not only by the tightness in world supplies but also by their financial inability to cope with rising fertilizer prices and shipping rates.

25. The impact of fertilizer shortages on grain output is suggested by the high fertilizer response ratios that may be obtained in various countries when chemical fertilizers are used with complementing inputs. In the USSR, at current levels of fertilizer application, each ton of plant nutrient applied to grain results in an average of 4 to 5 tons of additional output. In the United States, fertilizer has accounted for an estimated 40% of the increase in yields in recent years, in Taiwan about 33%, and in India about 60%.

26. The appearance of increased supplies of fertilizer in 1975 will not necessarily end the shortages, because demand for food will also have increased rapidly with the worldwide rise in population, income, and living standards.

APPENDIX

STATISTICAL TABLES

Table 1

World Fertilizer Production[1]

Thousand Metric Tons of Nutrients

	1960/61	1970/71	1971/72
Total	**29,911**	**72,475**	**77,632**
Nitrogen	10,920	32,962	35,122
Phosphate	10,221	21,919	23,392
Potash	8,770	17,594	19,118

1. Data in this and subsequent tables refer generally to fertilizer years beginning 1 July and ending 30 June. Data for some areas, however, principally the Communist countries, refer to the calendar year ending 31 December of the first stated year. Data are drawn mainly from reports of the Food and Agricultural Organization of the United Nations; they have not been adjusted to exclude nitrogen and potash used for technical purposes and anhydrous ammonia exported for further processing. Wherever possible they have been adjusted to include ground phosphate rock used directly as fertilizer. Data for the USSR have been adjusted to exclude phosphate feeds.

Table 2

World Production of Chemical Fertilizers, by Country

Thousand Metric Tons of Nutrients

	1960/61	1970/71	1971/72	1972/73[1]
Total	**29,911**	**72,475**	**77,632**	**N.A.**
United States	7,410	15,789	16,319	16,709
USSR	3,265	13,040	14,565	15,774
Canada	496	4,465	5,324	N.A.
France	3,021	4,644	4,698	N.A.
West Germany	3,897	4,743	4,640	N.A.
East Germany	2,166	3,244	3,247	3,285
Japan	1,544	2,770	2,806	N.A.
Poland	477	1,629	1,787	1,910
Other	7,635	22,151	24,246	N.A.

1. Preliminary.

Table 3

World Production of Nitrogen Fertilizer, by Country

Thousand Metric Tons of Nutrients

	1960/61	1970/71	1971/72	1972/73[1]
Total	**10,920**	**32,962**	**35,122**	**N.A.**
United States	2,739	8,161	8,318	8,420
USSR	1,003	5,423	6,055	6,572
Japan	1,030	2,105	2,121	N.A.
France	671	1,351	1,401	N.A.
West Germany	1,180	1,505	1,321	N.A.
Poland	270	1,030	1,081	1,147
Other	4,027	13,387	14,825	N.A.

1. Preliminary.

Table 4

World Production of Phosphate Fertilizer, by Country

Thousand Metric Tons of Nutrients

	1960/61	1970/71	1971/72	1972/73[1]
Total	**10,221**	**21,919**	**23,392**	**N.A.**
United States	2,626	5,369	5,795	5,832
USSR[2]	1,178	3,530	3,703	3,757
France	770	1,451	1,500	N.A.
West Germany	750	946	943	N.A.
Australia	569	695	762	N.A.
Belgium	289	745	736	N.A.
Japan	515	665	685	N.A.
Poland	207	599	706	763
Other	3,317	7,919	8,562	N.A.

1. Preliminary.
2. Excluding phosphates used for animal feeds.

Table 5

World Production of Potash Fertilizer, by Country

Thousand Metric Tons of Nutrients

	1960/61	1970/71	1971/72	1972/73[1]
Total	**8,770**	**17,594**	**19,118**	**N.A.**
USSR	1,084	4,087	4,807	5,445
Canada	....	3,179	3,904	N.A.
East Germany	1,666	2,419	2,445	2,458
West Germany	1,967	2,293	2,376	N.A.
United States	2,045	2,259	2,206	2,457
France	1,581	1,842	1,797	N.A.
Other	427	1,515	1,583	N.A.

1. Preliminary.

Table 6

World Fertilizer Exports, by Country[1]

Thousand Metric Tons of Nutrients

	1960/61				1970/71			
	Nitrogen	Phosphate	Potash	Total	Nitrogen	Phosphate	Potash	Total
Total	**2,491**	**1,210**	**3,720**	**7,621**	**6,607**	**2,799**	**9,491**	**18,897**
Canada	207	83	....	290	434	260	2,959	3,653
United States	193	216	439	848	977	815	563	2,355
West Germany	517	102	877	1,496	483	142	1,176	1,801
USSR	64	42	261	367	307	132	1,309	1,748
East Germany	114	....	1,092	1,206	2	....	1,739	1,741
Japan	286	24	....	310	1,410	28	....	1,438
France	78	67	751	896	192	97	859	1,148
Belgium	179	190	....	369	442	448	....	890
Netherlands	219	153	188	560	595	210	Negl.	805
Other	834	333	112	1,279	1,765	667	886	3,318

1. Because of transportation delays and differences in tabulation methods of the reporting countries, totals in this table do not agree with those in Table 7.

Table 7

World Fertilizer Imports, by Country

Thousand Metric Tons of Nutrients

	1960/61				1970/71			
	Nitrogen	Phosphate	Potash	Total	Nitrogen	Phosphate	Potash	Total
Total	2,620	1,145	3,860	7,625	6,183	2,732	9,362	18,277
United States	250	61	258	569	842	257	2,278	3,377
China	210	5	....	215	1,480	Negl.	5	1,485
Poland	15	....	317	332	Negl.	12	1,144	1,156
Brazil	51	32	106	189	235	215	306	776
France	20	176	....	196	208	340	183	731
United Kingdom	64	42	450	556	131	63	531	725
India	186	1	28	215	491	37	183	711
Japan	9	....	603	612	....	22	632	654
Czechoslovakia	34	....	217	251	98	24	526	648
Denmark	139	40	197	376	227	42	188	457
Belgium	9	18	165	192	81	48	305	434
Hungary	31	33	15	79	109	66	236	411
Italy	2	3	160	165	84	133	178	395
Netherlands	30	57	177	264	14	50	240	304
Other	1,570	677	1,167	3,414	2,163	1,423	2,427	6,013